

Status of Beech Bark Disease on the Allegheny National Forest

Status in the Fall of 1996

by

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Abstract

A resurvey of the Allegheny National Forest has revealed that, since the 1990 status report, the percentage of the forest proclamation area infested by the scale has increased from 30% to 70%. In the same time frame the Killing front has advanced to cover approximately 10% of the proclamation area; this represents a doubling of the area of the forest infected by the disease. On the Allegheny National Forest the scale is spreading much faster than the *Nectria* fungus.

Introduction

The development of Beech Bark Disease (BBD) has been described many times; with one of the better accounts being Houston and O'Brien (1983). To recapitulate; the introduced scale insect (*Cryptococcus fagisuga*) feeds on the beech trees and later the introduced fungus (*Nectria coccinea* var. *faginata*) colonizes the feeding wounds made by the scale. It is the fungal colonization of these feeding wounds that ultimately leads to the snap and death of the beech trees. As the scale migrates across the landscape independent of the fungus, there are two waves of colonization that spread across a newly infested forest. The first is the wave of colonization by the scale insect and is known as the "Advancing Front" and the second, known as the "Killing Front" occurs as the fungus colonizes the feeding wounds left behind by the advancing scale insects. This report was written to document the progress of both of these fronts have made since the 1990 status report (Jackson, 1990).

When Beech Bark Disease was first reported in West Virginia it was found that the fungus was not the exotic *N. coccinea* var. *faginata* but was the native *N. galligena* (Mielke *et al.*, 1982). Jackson (1990) reported an isolated pocket of scale insect at the Hearts Content reserve on the Allegheny National Forest. On investigating this pocket, Dr. David Houston (*pers com.*) was not able to detect either *N. galligena* or *N. coccinea* var. *faginata*, instead he found another native fungus, *N. ochroleuca*, being involved in this disease complex. Thus three fungi, two native and one exotic, can be involved in this diseases complex.

Methods

The results reported here were based upon a road side survey conducted in the summer and fall of 1996. A field crew made a road side survey of the forest stopping every mile or two whenever they sighted beech trees with a diameter of greater than 10 inches. Two different inspection methods were adopted. Knowing that the scale would be easier to detect than the *Nectria* fungus, a less involved method was used for the scale survey. When surveying for the scale, two observers would each inspect 10 large beech trees. In most cases if the scale was to be found it would be detected before 20 trees had been examined. If the scale was not detected within the first 20 trees, the observers would spend about another 10 minutes examining all of the large beech trees they could find. It was rare that this extra examination time would yield a positive record of the scale. At the end of the first day the crew would draw up a proposed itinerary for the next day. In this way a relatively complete coverage of the forest was obtained.

Knowing that the *Nectria* would be difficult to detect, the sample size was expanded to include about a 100 of the larger diameter trees at each sample site. In some cases where the fungus was suspected, the bark of the trees was examined with a hand lens.

It was decided that as diseases and insects do not recognize legal boundaries this survey would include all of the land of the Forest Proclamation boundary, although inspections would only be made on federal land. For the purposes of this report the proclamation area was taken as being 742,692 acres.

Results were initially presented as (0.25 inch diameter) colour coded dots on a 1:126,720 scale map. Two free-hand lines were drawn on this map to divide the forest up into three zones. One line separated the area free from scale from the area which had scale but not the *Nectria*, this became the "Advancing Front" line. The second line separated the area which had scale plus *Nectria* from the area which had only the scale. This second line was taken to represent the "Killing Front". The areas within the proclamation boundary were computed using a model 40 Lasico compensating planimeter.

Results

The results of the mapping exercise are presented in the two attached maps. One map shows the location of sample points plus the killing and advancing fronts implied by these points. Sampling points colored green represents stops where neither scale nor fungus were found. Blue was the color chosen to represent sample points where only the scale was found and red was reserved for sample point where both scale and *Nectria* were found. On the second map, the two fronts of the 1990 status report were overlain with the fronts of the 1996 survey.

Table 1

Area of the Forest Proclamation Boundary
infested by either Scale or BBD

		Proclamation Area of 742,692 acres	
		Acres	%
Area within the Killing Front	1990	36,912	4.97
	1996	73,675	9.92
Area within the Advancing Front	1990	223,996	30.16
	1996	522,558	70.36

Discussion

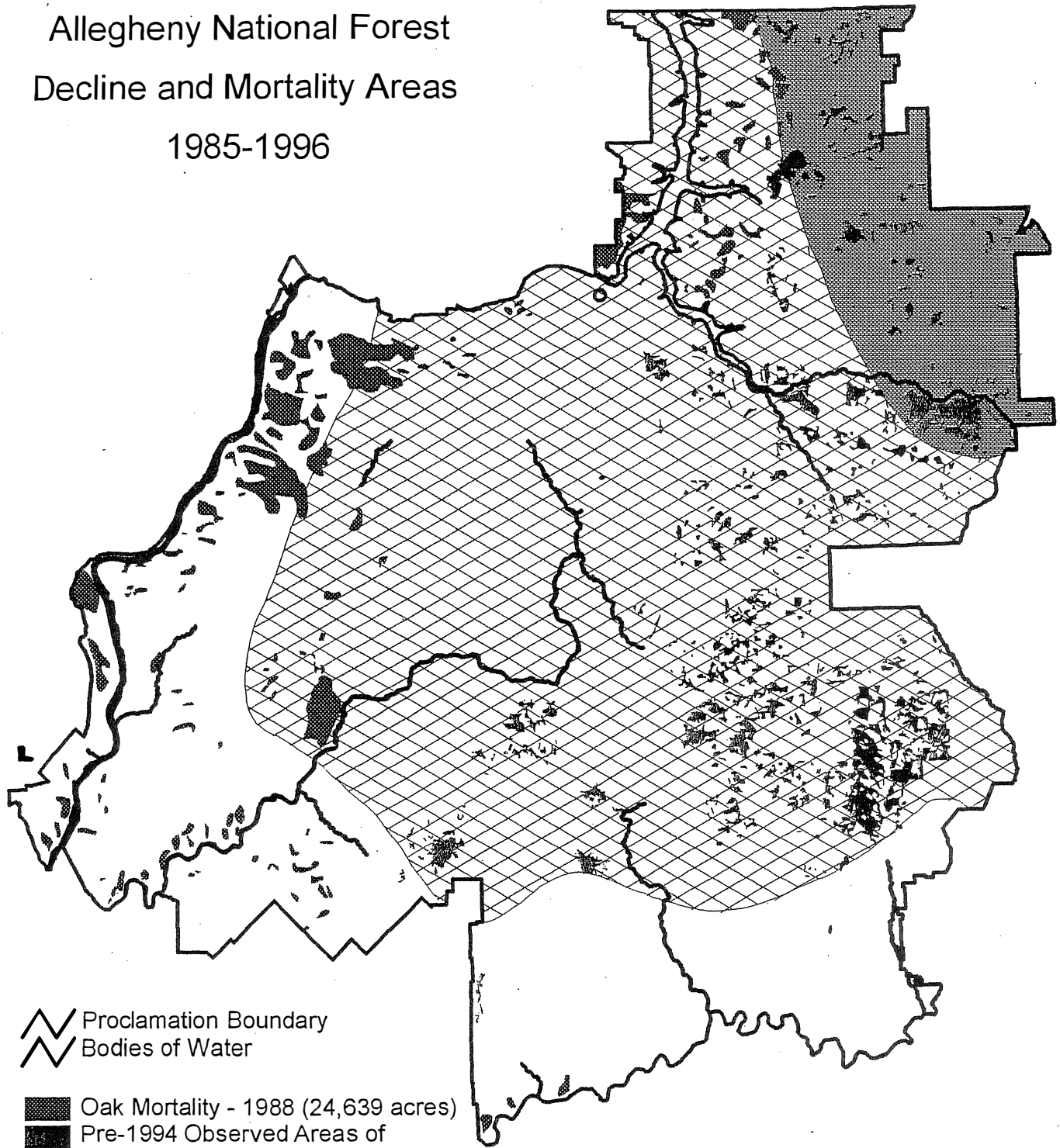
This survey reveals that the disease has doubled its hold within the proclamation area, and now covers about 10% of the forest and is concentrated in the NE corner (Bradford Ranger District) of the forest. This finding is in agreement with the predictions of Jackson (1990). Similarly, the area now occupied by the scale has increased from 30 to 70 % of the proclamation area and this also is in close agreement with the predictions of Jackson (1990).

When BBD was first detected on the Monongahela National Forest (Mielke et al, 1982) it was already infesting 69,946 acres of forested land in West Virginia. A resurvey in 1994 detected the scale insect infesting a forested area of 779,365 acres (Haynes, 1996). Thus in the 13 years since its detection in WV the area of scale infested forest had increased eleven fold (Haynes 1996). A more intensive survey in 1996, revealed that that the killing front encompasses 70% of the area occupied by the scale. On the Allegheny National Forest, the killing front encompasses only 14% of the area occupied by the scale. Why the disease is not spreading or developing as fast on the Allegheny as on the Monongahela national forest is not immediately obvious. Part of the answer will probably lie in the observation that the native *N. galligena* has played a bigger role in disease development in PA than it has in WV.






When Jackson made his 1990 survey he recorded an outlying population of scale at the Hearts Content Reserve. Today that population lies within the advancing front. On the maps it is shown as a point of Beech Bark Disease well outside the killing front. While we were unable to detect any *N. coccinea* var *faginata* at Hearts Content, it was recorded as a location of Beech Bark Disease, for not only had Houston (*pers com*) recorded *N. ochroleuca* from here but beech mortality of the old growth was very heavy. While a survey of the scale infested stands around Hearts Content failed to reveal any significant amounts of mortality, the authors are comfortable describing

Allegheny National Forest Decline and Mortality Areas 1985-1996

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Proclamation Boundary
Bodies of Water

-  Oak Mortality - 1988 (24,639 acres)
-  Pre-1994 Observed Areas of Decline/Mortality (13,751 acres)
-  1994-1996 Areas of Decline/Mortality (23,997 acres)
-  Beechbark Scale Killing Front
-  Beechbark Scale Advancing Front

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Morgantown, WV
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Hearts Content as an isolated pocket of Beech Bark Disease. This area of disease does not appear to be expanding.

When comparisons were made between the 1991 and 1996 data, from three permanent Beech Bark Disease monitoring plots on the Allegheny National Forest, the results supported the observations made in this survey. Approximately 400 trees, in three plots, have been examined annually since the plot establishment in 1986. Combined plot data reveals that; 5% had died by 1991 and by 1996, 14% were dead. Presently scale is now found on 71% of the beech trees, down from 87% in 1991. While the total number of scale infested trees might not be significantly different, the numbers of trees in the moderately plus heavily infested classes was reduced from 41% to 13%. *Nectria* was initially found on 3% of the trees and is now found on only 1.5% of the trees. While it is true that trees are continuing to die in the monitoring plots, both the scale and the fungus are not presently as common as they were in 1991.

While this report indicates that the scale insect now covers 2.3x as much of the proclamation area as it did in 1990, it was only at Hearts Content that large populations of scale insects could be found. Trees that looked like they had been whitewashed by the scale were much less common than in previous years. The authors have noted that in recent years the scale populations have not been as high they had been in 1990 and 1991. In recent years the authors have encountered the twice stabbed lady bug feeding on the scales. After a particularly hard winter the authors noted that the scale populations on the Allegheny National Forest appeared to decline to a greater extent than had the populations on the Monongahela National Forest. Perhaps, biological control agents and abiotic influences are having a greater impact on disease development in the more northerly Pennsylvanian forest.

References

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